Spitzbergen. They made four attempts to press through the ice, and failed, as all their predecessors had failed. But it is stated by German writers that this expedition attained the highest point ever reached by a sailing vessel, namely, 81° 5′ N. This is a mistake. Parry reached 81° 5′ N. in the *Hecla*, and 81° 13′ in his boats, and Scoresby reached 81° 30′ N. in 1806, on board the *Resolution* of Whitby. In 1869 the second German expedition sailed, also under command of Captain Koldewey, with instructions from Dr. Petermann to penetrate through the belt or girdle of ice which encircles the open polar basin of his imagination, to winter at the pole, and then to sail across it and explore the Siberian islands. All very easy to write at Gotha! But, as usual, Captain Koldewey was stopped, as all his predecessors had been, by the closely-packed ice, and wintered on the east coast of Greenland, at a part which was visited by Sabine and Clavering in 1823. The German explorers made careful scientific observations, and partly examined a very interesting navigable fiord running into the heart of Greenland. The expedition returned to Bremen in September 1870, and the experience acquired by two seasons in the ice has enabled its talented and energetic commander to form an authoritative opinion on the best route for north polar exploration. Captain Koldewey, the first German authority on Arctic navigation, fully concurs with Captain Osborn that the way to explore the unknown region is by sending an expedition up Smith Sound.

The other Arctic voyages that have been made since 1865 are of minor importance. In 1869 Dr. Bessels crossed the sea between Spitzbergen and Novaya Zemlia, and met with field ice between 76° and 77° N. in August. Norwegian fishermen named Ulve, Carlsen, and Johannesen, found the Sea of Kara comparatively free of ice in 1869—70, and the latter is said to have sailed round Novaya Zemlia. In 1870 Count Zeil and von Henglin made some useful observations on the east side of Spitzbergen during a yacht voyage, and obtained a sight of the still more eastern Gillis Land. In the present year Lieut. Payer, who served under Captain Koldewey, made a voyage towards the Polar pack, between Spitzbergen and Novaya Zemlia, and he reports having nearly reached the 79th parallel, between the 40th and 42nd meridians east from Greenwich, and again in 60° E., finding open water. But Mr. Smith, an English yachtsman, in the same season, was more lucky or more adventurous. He reached the latitude of 81° 13′ N., the highest that has ever been ever observed on board a ship. Scoresby, indeed, reached an *estimated* latitude of 81° 30′ on May 24, 1806, but his highest *observed* latitude was 81° 12′ 42″ on the 23rd. These voyages merely confirm the observations of Nordenskiöld and earlier explorers, that, though the pack is usually met with, east of Spitzbergen, between 75° and 77° N., it may not be reached in exceptional years until the 81st, or even the 82nd parallel is attained.

Such have been the results of Arctic exploration since Sherard Osborn submitted his proposal in 1865. They fully confirm the correctness of his views; and the best English and German Arctic authorities are now in complete accord. There is, therefore, no longer any reason for postponing the consideration of this question. Six years have been wasted, and the men who were available to lead an expedition in 1865, may be unable to do so now. But the navy of England still abounds in the same stuff that made a Parry, a James Ross, a McClintock, and an Osborn in former years: and it must always be remembered that it is out of young Arctic explorers that Nelsons are formed. The arguments for Osborn's scheme of exploration by Smith Sound are now strengthened by the experience of Nordenskiöld and Koldewey. The same evidence of the important scientific results to be obtained by an Arctic expedition that was produced by the highest authorities in 1865, is forthcoming now. The argument that such enterprises in the pursuit of Science have an excellent effect upon the naval service is as strong now as it was then. We may, therefore, reasonably hope that (the Duke of Somerset's reason for postponing the question having been entirely removed) the Admiralty would take the subject of Polar exploration into favourable consideration, if the scientific societies once more submitted it, with the same arguments as were used six years ago.

C. R. MARKHAM

ORD'S NOTES ON COMPARATIVE ANATOMY

Notes on Comparative Anatomy: a Syllabus of a Course of Lectures delivered at St. Thomas's Hospital. By W. M. Ord, M.B. (Churchill, 1871.)

DR. ORD may be congratulated on having put together this compact, lucid, and well-arranged Syllabus. It is well adapted to serve as a framework, for lecturers on Comparative Anatomy to fill up, and students may also use it to refresh the memory when once stored with more slowly acquired information. The abuse of it will be for men to bolt this condensed extract of scientific food in order to produce it again under examination. The author seems to have foreseen this danger, and not only warns against it, but has been careful to preserve the bald and dry style which ought to repel those who do not know how to use the book as he intends. Still, experience of the way in which Prof. Huxley's "Introduction to Classification" is misused by being literally learned by rote, shows to what ill uses such compendia may be put.

The Syllabus begins with a short summary of the distinctive characters of the organic and of the animal kingdoms, followed by a scheme of classification which follows that of the introduction just referred to. The several animal classes from Protozoa to Mammalia are then treated, so that the arrangement is a zoological one. It would perhaps have been better if the author had devoted less space to the enumeration of the characters of orders and classes, since these are found in other manuals, and if anatomical points of difficulty had been more fully explained. For example, more detailed exposition of subjects like the morphology of the compound Hydrozoa, the development of Echinoderms, and the formation of the placenta, would have been exceedingly valuable. For such an object, however, diagrams are almost essential, and, accepting Dr. Ord's plan, it must be admitted that he has carried it out with a due regard to symmetry. The only subject which the Syllabus appears comparatively to neglect is the difficult but important one of Embryology. The account given of the Annulata and Entozoa is particularly clear and excellent. The following extract is a fair specimen of the author's style and method:—

"CL. BRACHIOPODA.—Solitary bivalves, in which the

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valves are dorsal and ventral, like the two parts of a cabriolet in relation to the animal within, instead of lateral (wing-like) as in Lamellibranchs. Valves joined by hinge or not; never with elastic spring. When not hinged, the valves imperforate; when hinged, one, the larger, is perforate for the transmission of an anchoring ligament, in the non-hinged the ligament passes out between the valves. The class is divided into two orders or subclasses,—the Articulate and the Inarticulate. The Articulate, of which Terebratula is type, have usually curious shelly processes developed from the inner surface of the imperforate valve for the support of the arms, and have in the adult condition no anus; the Inarticulate, of which Lingula is type, have no arm-supporting processes and have no anus."

The account given of the vertebrate skeleton, and especially of some disputed questions of homology, is not so satisfactory as most other parts of the Syllabus. It may be doubtful whether it is desirable to introduce into elementary lectures the difficult subject of the representatives of the tympanic bones in the lower vertebrata; but if so, it is quite useless for men to learn to repeat the "views" of Owen, Huxley, Peters, Parker, and Humphry, and to assign the right view to the right man, unless they are familiar with the facts of embryology, on which alone a judgment can be formed. Now, whether the incus belongs to the first visceral arch, as here stated (p. 113), or to the second, as is believed by some original observers, makes all the difference as to the correctness or incorrectness of the statements which follow. Again, whatever doubt still remains as to the homologies of the pelvis and shoulder girdle, surely no one who has read Prof. Flower's paper on the subject and his subsequent remarks in the "Osteology of the Mammalia," can accept the correspondence of the pubes with the clavicle. The former may very probably answer to a procoracoid, as Gegenbaur and other anatomists suppose, but its mode of development its position in reptiles, and its relation to the great nerves and vessels of the hind limb, are all conclusive against the homology given in p. 116, and more fully in p. 146. No reason is assigned for the query affixed to the statement (p. 171) that the elephant's placenta is deciduous and zonary, which zoologists have hitherto accepted on the testimony of more than one careful and independent observer. The statement as to the number of the cervical vertebræ in mammalia (p. 172) is not exact. No Cetacean has yet been found in which the full number cannot be distinguished, however much fused together the vertebræ may become. On the other hand, the manati has never more than six, and the same appears to be true of one species of *Cholopus* (not Cholœpus).

No mention is made of the order Dipnoi in the classification of fishes taken from Müller (p. 117), or again in the characters of the orders (pp. 133-135). So remarkable a form as *Lepidosiren* should not have been omitted, even if Dr. Ord accepts the conclusion which Dr. Günther has very lately stated in these columns (vol. iv. Nos. 99 and 100). The new genus *Ceratodus*, now that its anatomy has been so fully investigated, forms no doubt a very complete link between the Ganoids and the Dipnoi, and many zoologists will agree with the classification proposed in the admirable paper just referred to; but books intended for students should scarcely pursue the "latest views" so closely.

In conclusion it is only fair to repeat that these Notes deserve commendation for their general accuracy, and contrast very favourably with some other manuals for students on the same subject. They will, if well used, be valuable to learners, and perhaps still more so to teachers.

P. H. PYE-SMITH

OUR BOOK SHELF

Note-book on Practical Solid or Descriptive Geometry, containing Problems with help for Solutions. By J. H. Edgar, M.A., Lecturer on Mechanical Drawing at the Royal School of Mines, &c., &c., and G. S. Pritchard, late Master for Descriptive Geometry, Royal Military Academy, Woolwich. (London and New York: Macmillan and Co., 1871.)

WHEN our Civil and Military Engineering Examinations are daily making larger demands for geometrical proficiency a new and exceedingly lucid Note-book on Descriptive Geometry comes well-timed. Though much has been done to expand this collateral offshoot of geometrical science since M. Monge, of the Ecole Polytechnique, first started it, the co-ordinative characteristic of a science has hitherto been wanting; it has contained, doubtlessly, all the abstract principles of orthographic projection, but principles, to be available, must be interdependent and derivative. Messrs. Edgar and Pritchard have felt this deficiency, and have done much to remove it. Their book, unlike the majority of cheap hand-books, is neither "patchy nor scrappy," but a continuous and coherent whole. "Elementary Explanations, Definitions, and Theorems" come first, followed by twenty-eight problems on "The Straight Line and Plane;" to these succeed Solids, first singly, and then in "Groups and Combinations." In like logical order we next have "Solids with the inclinations of the plane of one face, and of one edge or line in that face given," and then "Solids with the inclinations of two adjacent edges given," and, lastly, in this category, "Solids with the inclinations of two adjacent faces given." So far we have the principles of projection in a much more perfectly co-ordinated arrangement than we have hitherto found them in, and we must say that the mere act of mentally assimilating this interdependence of principles would be wholesome discipline, even if it did not, as it unquestionably does, facilitate each successive step in progress, and, most of all, conduce to an integral entertainment of the subject. Again, as naturally derivable from the consideration of the inclined faces of solids, we arrive at "Sections by oblique planes," and "Developments," or the spreading out in one plane of the adjacent faces of such solids; and, finally, the development of curved surfaces. "Miscellaneous Problems" now have place, and amongst them we notice one from the "Science Examinations" of last year. The sequence of the four next chapters is judicious. "Tangent Planes," "Intersections of solids with plane surfaces," "Intersections of solids with curved surfaces," "Spherical Triangles." A short chapter on Isometric Projection (quite as long as it deserves) ends the work, the authors of which we rejoice to find (in these days of "result-seeking") much more desirous of results actual than results visible, and accordingly, foregoing a somewhat too popular profusion of diagrams, which, while it undoubtedly facilitates the bare apprehension of subject-matter, by no means enforces that comprehension of the subject which attends upon the act of accomplishing a mental diagram for ourselves. In this expression of their conviction the authors, we observe, are at one with Mr. Binns, who, with the same sincerity, and for like reason, resisted the systematic use of models in the teaching of "mechanical drawing."

Messrs. Edgar and Pritchard have produced an inexpensive, but a well-digested, comprehensive, lucid, and typographically attractive *vade mecum*.

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